IS 6026 (1985): Specification - hand operated sirens [CED 22: Fire Fighting]

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Indian Standard

SPECIFICATION FOR HAND-OPERATED SIRENS

(First Revision)

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INDIAN STANDARDS INSTITUTION
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
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SPECIFICATION FOR HAND-OPERATED SIRENS

(First Revision)

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Indian Standard

SPECIFICATION FOR HAND-OPERATED SIRENS

(First Revision)

0. FOREWORD

0.1 This Indian Standard was adopted by the Indian Standards Institution on 24 April 1985, after the draft finalized by the Fire Fighting Sectional Committee had been approved by the Civil Engineering Division Council.

0.2 Hand-operated sirens may be conveniently adopted where it is not feasible to use the electrically operated sirens. Hand-operated sirens are used for civil defence purposes, for giving time signal in factories, workshops, schools and similar organizations. The audibility range of such sirens is limited and vary depending upon environmental conditions and it may be necessary to employ more than one siren to cover larger areas. This standard which was first issued in 1970 has been formulated for providing guidance with regard to the shape, material, design, construction, performance and testing of hand-operated sirens. The revision has been prepared so as to give specific equirement for its various components besides updating requirements in respect of material specification and mounting arrangement (deleting the provision of wall bracket).

0.3 One of the important factors affecting the efficiency of the hand-operated sirens is the relative height between the siren and the height of the person operating it. The standard has, therefore, provided a portable floor and with adjustable arrangement.

0.4 In the preparation of this standard considerable assistance has been rendered by National Physical Laboratory, New Delhi.

0.5 For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS : 2-1960*. The number of significant places retained in the rounded off value should be the same as that of the specified value in the standard.

*Rules for rounding off numerical values (*revised*):

1. SCOPE

1.1 This standard lays down the requirements regarding the shape, material, design, construction, performance and testing of hand-operated sirens.

GENERAL

2.1 The Siren shall comprise the following parts (*see* Fig. 1):

a) Siren body with disc and handle,

b) Portable stand, and

c) Guard.

3. MATERIAL

3.1 Siren Body – The siren body shall be of aluminum alloy conforming to IS : 617-1975*.

3.1.1 *Rotor* — The rotor shall be of aluminium alloy conforming to IS : 617-1975*.

3.1.2 *Gears* — The gears shall be of carbon steel conforming to IS : 4431-1978† or cast iron conforming to Grade FG 200 of IS : 210-1978‡,

3.1.3 *Operating Handle* — The operating handle shall either be of cast iron conforming to IS : 210-1978‡ or of mild steel sections conforming to IS : 1977-1975§.

3.2 Portable Floor-stand — The portable floor-stand shall be of mild steel tubes conforming to IS : 3601-1966‖.

3.3 Guard — This shall be of galvanized iron wire not less than 1·6 mm diameter conforming to IS : 280-1978¶.

3.4 The waterproof cover shall be olive green colour and conform to variety No. 2 of IS : 1424-1977**.

4. SHAPE AND DIMENSIONS

4.1 The shape and essential dimensions are shown in Fig. 1.

4.2 The cover shall completely cover the siren and floor-stand, up to and including the height adjusting bolts when the floor-stand, with the siren mounted on it, is extended to its maximum height. The stitches on the waterproof cover shall be even and unbroken.

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*Specification for aluminium and aluminium alloy ingots and castings for general engineering purposes (*second revision*).

†Specification for carbon and carbon-manganese free-cutting steel (*first revision*).

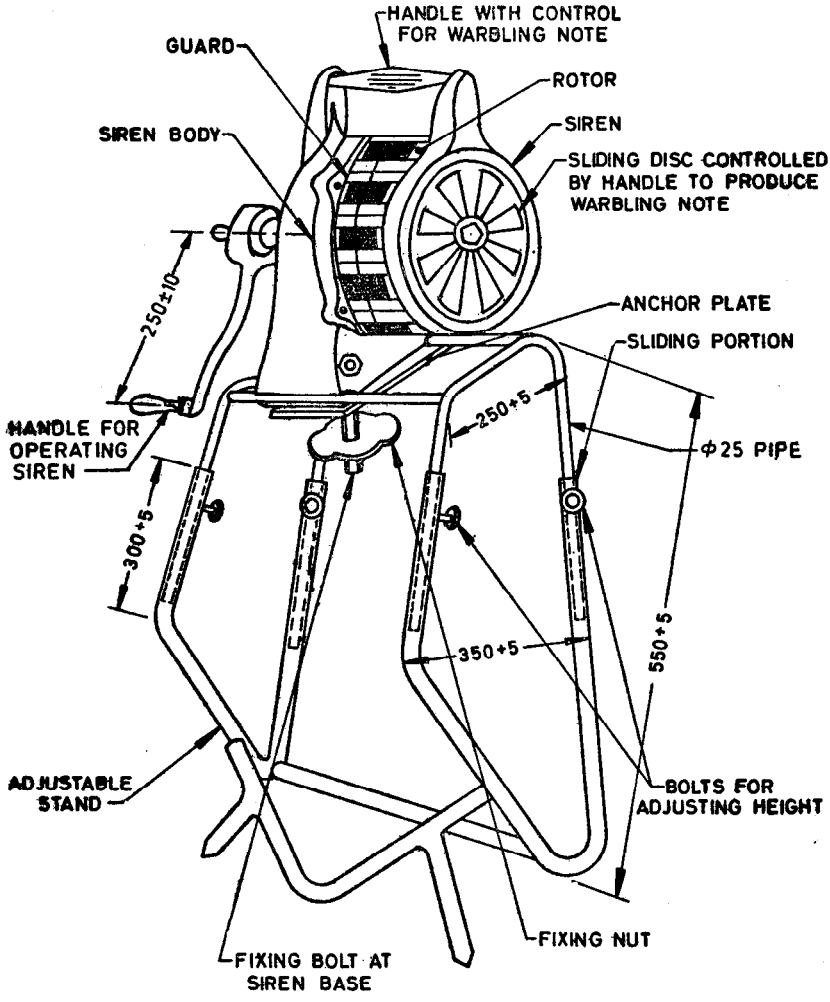
‡Specification for grey iron castings (*third revision*).

§Specification for structural steel (ordinary quality) (*second revision*).

‖Specification for steel tubes for mechanical and general engineering purposes.

¶Specification for mild steel wire for general engineering purposes (*third revision*).

**Specification for cotton canvas (*second revision*).



All dimensions in millimetres.

FIG. 1 HAND-OPERATED SIREN MOUNTED ON THE FLOOR-STAND

5. PERFORMANCE REQUIREMENT

5.1 The siren shall be capable with ease in operation of withstanding not less than 5 000 cycles of operations when determined according to method given in Appendix A.

5.1.1 The pitch of the note emitted by thes iren shall also be between 300 to 1 000 Hz.

5.2 The sound power output of the siren when tested by the method described in Appendix A at 60 $\pm$ 2 rev/min shall be not less than 1·5 W of acoustical power.

NOTE — This corresponds to mean sound pressure level of not less than 118 dB with reference to 0·000 02 N/m^2 (0·000 2 dynes/cm^2) when measured in a semi-reverberant room of 127·5 m^3 volume and reverberation of 2 seconds or equivalent.

5.3 The torque required to drive the siren in operative condition at a speed of 60 $\pm$ 2 rev/min shall be not more than 1·5 Nm when tested according to method given in Appendix B.

6. WORKMANSHIP, FINISH AND COVER

6.1 All forgings and castings shall be sound and free from pits, blowholes, scales, cracks and other imperfections and shall not be repaired or filled so as to hide casting defects. All burrs and sharp edges shall be removed and/or rounded and made smooth.

6.2 The floor stand shall be painted with fire-red paint (Shade No. 536 of IS : 5-1978*). Siren body and parts shall be finished in natural colour, varnished or polished.

6.3 Lubrication points shall be clearly marked by painting the words 'oil' or 'grease', as applicable, near nipples point.

7. INSTRUCTION BOOK

7.1 An illustrated book containing simple, easy to follow instructions for mounting the siren on the floor stand for its normal operation and upkeep (including lubrication) shall be kept with each siren unit. The book shall also include an itemized and illustrated spare parts list giving reference number to all wearing parts with a view to ensure that adequate number of such spare parts can be made readily available, when necessary.

8. MARKING

8.1 Each siren shall be permanently marked with the following :

a) Name of manufacturer or trade-mark, if any; and

b) Year of manufacture.

8.1.1 The siren may also be marked with the ISI Certification Mark.

NOTE — The use of the ISI Certification Mark is governed by the provisions of the Indian Standards Institution (Certification Marks) Act and the Rules and Regulations made thereunder. The ISI Mark on products covered by an Indian Standard conveys the assurance that they have been produced to comply with the requirements of that standard under a well-defined system of inspection, testing and quality control which is devised and supervised by ISI and operated by the producer. ISI marked products are also continuously checked by ISI for conformity to that standard as a further safeguard. Details of conditions, under which a licence for the use of the ISI Certification Mark may be granted to manufacturers or processors, may be obtained from the Indian Standards Institution.

*Specification for colours for ready mixed paints and enamels (*third revision*).

APPENDIX A

(*Clauses* 5.1 *and* 5.2)

METHOD FOR MEASUREMENT OF ACOUSTAL POWER AND DURABILITY

A-1. ACOUSTAL POWER

A-1.1 An electrically-operated siren having known rating or any other calibrated sound source may be used as a reference source. The sound pressure level created by the siren under test, in a semi-reverberant enclosure shall be measured and compared with source substituted by the siren under test.

A-1.2 The acoustic power W of the siren under test can be obtained from the following formula :

$$10 \log_{10} \frac{W}{W_0} = 10 \log_{10} \frac{W_r}{W_0} + 20 \log_{10} \frac{P_m}{P_0} - 20 \log_{10} \frac{P_r}{P_0}$$

where

W = acoustic output of the siren in watts,

W_0 = 10^{-12} watts;

$10 \log_{10} \frac{W_r}{W_0}$ = acoustic power level of the reference source in dB with reference to 10^{-12} watts,

$20 \log_{10} \frac{P_m}{P_0}$ = sound pressure level due to the siren under test with reference to 0·000 02 N/m² (0 000 2 dynes/cm²), and

$20 \log_{10} \frac{P_r}{P_0}$ = sound pressure level due to ther eference sources with reference to 0 000 02 N/m² (0·000 2 dynes/cm²).

A.1.3 The above formula can be stated in a simplified form as acoustic power level of the siren under test in dB is equal to acoustic power level in dB of the reference source plus the sound pressure level in dB due to the siren under test minus sound pressure level in dB due to the reference source.

A-2. DURABILITY

A-2.1 With warbling note control disc set in position where port holes are open, siren shall be operated from rest and worked up to its operating speed 60 ± 2 rev/min for a period of 2 min. This shall constitute one

operation cycle. The cycle shall be repeated after allowing the rotor to come to rest and continue till 5 000 cycles are completed. The driving mechanism and rotor shall not show any sign of excessive wear, or play and wobble in the axles after this period. It shall not show any tendency to topple.

APPENDIX B

(*Clause* 5.3)

METHOD OF MEASUREMENT OF TORQUE

B-1. EXPERIMENTAL SET-UP

B-1.1 One end of suitable steel rod A, supported on two ball-bearings B_1 and B_2 fixed to stands S_1 and S_2 (*see* Fig. 2), shall be coupled to the siren the driving effort of which has to be measured. The other end of the rod shall be attached to a handle H which could be turned. The stands S_1 and S_2 shall be made adjustable so that sirens of different heights and diameters could be mounted on the same base for torque measurement. A semi-circular disc D with its plane perpendicular to the rod axis is suitably fixed to the coupling rod on the siren end and a spring-loaded pointer P which could move on the disc shall be fixed at the handle end. When the handle is rotated, a twist proportional to the applied torque is produced in the coupling rod and this is indicated by relative shift in the position of the pointer on the disc.

B-2. CALIBRATION

B-2.1 For calibrating the radial movement of the pointer in terms of torque, the handle H is replaced by a pulley of known radius R and the rod end, which is normally coupled to the siren, is rigidly clamped. The twisting couple is applied by means of a weight of mass M kept in a pan attached to a string passing round the pulley. This loading arrangement helps to keep the power arm equal to R (radius of the pulley) for all positions of the pulley and all values of angular displacement. By increasing M gradually, the torque applied for different values of M is calculated and the relative shift of the rod determined by noting the pointer position on the disc D. The effort required to operate any siren under test is then obtained from the pre-graduated dial.

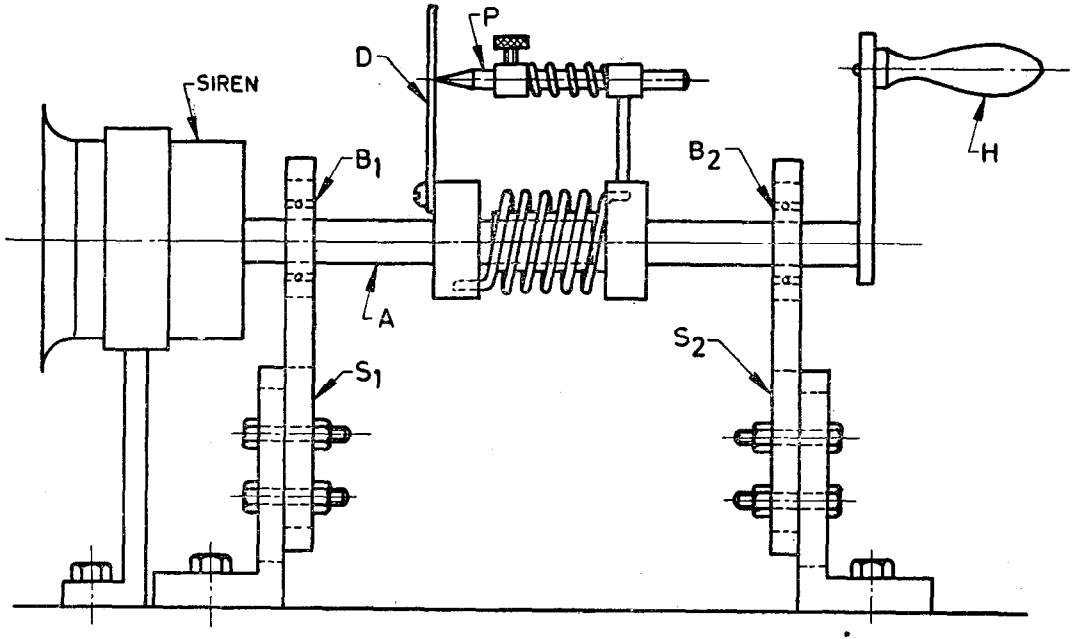


FIG. 2 TORQUE MEASURING DEVICE FOR HAND-OPERATED SIREN

B-2.1.1 If M is the mass placed in the pan, g is the acceleration due to gravity in m/s^2, and R the raidus of the pulley, the twisting force MgR is given by the following equation.

$$MgR = \frac{\pi\eta\theta r^4}{2l} \text{ Newton metres}$$

where

η = coefficient of rigidity of the rod material in N/m^2,
θ = angle of twist in radians,
r = radius of the rod in metres, and
l = length of the rod in metres.

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Base Units

Quantity	*Unit*	*Symbol*
Length	metre	m
Mass	kilogram	kg
Time	second	s
Electric current	ampere	A
Thermodynamic temperature	kelvin	K
Luminous intensity	candela	cd
Amount of substance	mole	mol

Supplementary Units

Quantity	*Unit*	*Symbol*
Plane angle	radian	rad
Solid angle	steradian	sr

Derived Units

Quantity	*Unit*	*Symbol*	*Definition*
Force	newton	N	1 N = 1 kg.m/s^2
Energy	joule	J	1 J = 1 N.m
Power	watt	W	1 W = 1 J/s
Flux	weber	Wb	1 Wb = 1 V.s
Flux density	tesla	T	1 T = 1 Wb/m^2
Frequency	hertz	Hz	1 Hz = 1 c/s (s^{-1})
Electric conductance	siemens	S	1 S = 1 A/V
Electromotive force	volt	V	1 V = 1 W/A
Pressure, stress	pascal	Pa	1 Pa = 1 N/m^2

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